

CDC's Malaria Research



For more than 60 years, the Centers for Disease Control and Prevention (CDC) has been a leader in the fight against malaria since successfully eliminating it in the United States. Building on that success, CDC experts continue to develop and evaluate malaria control interventions to reduce malaria illness and death and ultimately to eliminate malaria globally. CDC's strategic research helped develop and evaluate each of the effective tools now used throughout the world to prevent and control malaria:

- Insecticide-treated bed nets (ITNs)
- Intermittent preventive treatment for pregnant women (IPTp)
- Improved management of malaria illness with rapid diagnostic tests (RDTs) and artemisinin-containing combination therapies (ACTs)
- Indoor residual spraying (IRS)

Massive scale-up of these proven interventions in the last decade has led to unprecedented gains in the fight against malaria. From 2000 to 2012, 3.3 million lives were saved globally, and malaria deaths in Africa were cut nearly in half.

The Changing Malaria Landscape Calls for New Tools and Approaches

Now, in countries with high malaria transmission where interventions have reached high levels of coverage, the number of people ill or dying from malaria has decreased. Even so, the numbers remain unacceptably high. In many places, success in controlling malaria has changed malaria transmission patterns so that some areas have almost no malaria. In addition, in much of Africa, the mosquito that transmits malaria is not killed or repelled by the insecticides being used, and in Asia, the malaria parasite is becoming resistant to artemisinin, the principal component of the combination treatments that are used to treat malaria worldwide. If the past is an indicator, resistance to these life-saving antimalarials will spread to Africa. Success and resistance are creating a malaria landscape that requires new tools and approaches.



(Top) The iMSaT team attends barazas (community meetings organized by the village chief) to explain iMSaT, test the people who attend, and treat those who are infected. (Below) A health worker visits a home to test residents for malaria and treat those infected.

CDC Tests New Interventions

In the last decade, currently available malaria interventions have dramatically decreased the number of deaths and cases of malaria, but to take the next step toward eliminating malaria, new interventions are needed. One new intervention that CDC is piloting, intermittent mass screen and treat (iMSaT), involves testing all people living in areas with malaria transmission and then providing treatment to people infected with the malaria parasite. Once they are treated, their blood no longer contains parasites and cannot infect the mosquitoes that bite them. If iMSaT is effective, it may be scaled up countrywide and beyond. CDC is evaluating other interventions, such as mass drug administration, to stay ahead of the parasite.

CDC is actively conducting research to develop and evaluate innovative cutting-edge tools so that malaria efforts can continue to save lives and reach the goal of elimination. Examples include iMSaT (box), as well as:

- LAMP: Development of a field-ready, point-of-care molecular diagnostic assay device based on CDC's recent work to improve detection of malaria parasite DNA. This device, unlike an RDT, will be able to detect low-level infections in healthy people who go on to infect mosquitoes and sustain transmission of malaria in endemic areas.

- Durable wall liners (DLs): These thin sheets treated with insecticides mimic the effect of IRS. CDC has evaluated the added benefit of DLs, when used together with ITNS, in Kenya, and will soon begin a study in Malawi.



Preliminary analysis from Kenya indicated that the added benefit of DLs to ITNs was a reduction in the incidence of new malaria infections by 38% among all household members.

- Spatial repellents are chemicals that repel mosquitoes and may be useful for outdoor-biting mosquitoes that transmit malaria. ITNs and IRS primarily provide protection against mosquitoes that bite indoors. We are beginning an evaluation of the use of these repellents in Kenya.
- Vaccine: CDC is evaluating a malaria candidate vaccine, RTS,S/AS01, in Siaya, Kenya, one of 11 Phase III trial sites. Over 18 months, the vaccine prevented 941 cases per 1,000 children vaccinated and 444 cases per 1,000 infants vaccinated. Vaccine effectiveness was even higher at the KEMRI/CDC site in Siaya, where transmission was more intense.



Surveillance, Monitoring, and Evaluation

CDC is working to determine the most efficient ways to track the progress of malaria control and elimination, identify setbacks, and respond rapidly when needed, as well as to determine how such tools can be used to measure public health impact. For example, in Zanzibar, in collaboration with the Ministry of Health and Social Welfare, CDC, as part of the President's Malaria Initiative, embarked on a public-private partnership with a telecommunications provider to develop a next-generation surveillance system that communicates in real time weekly confirmed malaria cases. If an unusual increase is detected, a rapid response is begun.

Investment in monitoring and evaluation systems not only provides the data needed to measure the impact of the U.S. Government's malaria control investments, but also builds local capacity—necessary for the long-term success of malaria control efforts. CDC has supported many public health workers to obtain advanced degrees and certificates, including PhDs and masters' degrees. Their ability to conduct research and interpret results helps provide the evidence base for programmatic decisions.

A Congressional Mandate

Recognizing CDC's strengths, Congress under the Lantos-Hyde Act directed CDC to "advise the U.S. Global Malaria Coordinator on priorities for operations and implementation research" and "on monitoring, surveillance, and evaluation activities" and "to be a key implementer of such activities." CDC fulfills this role by implementing the U.S. President's Malaria Initiative with USAID and by focusing our expertise to produce critical evidence on new tools and strategies to impact malaria globally.

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